RECOVERY OF METALS FROM JAROSITE-CONTAINING MATERIALS

[0001] The present application is a continuation of and claims priority to PCT/ZA02/00024 filed March 6, 2002, which was published in English on September 12, 2002, and which claims priority to South African Patent Application No. 2001/1927 filed March 8, 2001, the entire contents of both are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

[0002] This invention relates to the recovery of metals from jarosite-containing materials.

[0003] The leaching of certain metals e.g. silver (Ag), lead (Pb) and zinc (Zn) using brine leaching, is well known.[1,2,3,4,5] The ease of solubilising these metals depends on the refractory nature of the material treated.

[0004] To improve recoveries from refractory materials by brine leaching, a combined high temperature oxidation process in combination with acidic brine leaching has been proposed.[4] A concentrate containing silver, mostly in sulfide minerals, yielded only 50% Ag dissolution in a $FeCl_3$ brine leach. By leaching the concentrate at temperatures above 100°C with a high oxygen partial pressure in an acidic NaCl or $CaCl_2$ medium, the Ag recovery was increased to above 95%.

[0005] Brine leaching alone is not effective in solubilising metals included in or encapsulated by jarosite or other similar iron hydroxy sulfate compounds since these compounds must first be decomposed.

[0006] Decomposition of jarosites in alkaline media is well known. Jarosites produced during pressure leaching of zinc concentrates were decomposed by treating the residues with a lime slurry at 90°C.[7] The following reactions were proposed to describe the reactions for hydronium jarosite, plumbojarosite and argentojarosite respectively:

$$H_3OFe_3(SO_4)_2(OH)_6 + 2Ca(OH)_2 + H_2O \rightarrow 3Fe(OH)_3 + 2CaSO_4 \cdot 2H_2O$$

$$PbFe_6(SO_4)_4(OH)_{12} + 4Ca(OH)_2 + 8H_2O \rightarrow 6Fe(OH)_3 + Pb(OH)_2 + 4CaSO4 \cdot 2H2O$$

$$AgFe_3(SO_4)_2(OH)_6 + 2Ca(OH)_2 + 4H_2O \rightarrow 3Fe(OH)_3 + AgOH + 2CaSO_4 \cdot 2H_2O$$